TEMPERATURE DEPENDENCE OF SPONTANEOUS POLARIZATION IN BARIUM HEXAFERRITE

V. Turchenko[1], D.B. Migas[2], S.V. Trukhanov[3], A.V. Rutkauskas[1], B. Bozzo[4], I. Fina[4], A.V.Trukhanov[3]

[1] *Joint Institute for Nuclear Research, 6 Joliot-Curie Str., Dubna, 141980, Russia;*
[2] *Belarusian State University of Informatics and Radioelectronics, P. Browka 6, 220013 Minsk, Belarus;*
[3] *SSPA "Scientific and Practical Materials Research Centre of NAS of Belarus", 19 P. Brovki str., 220072 Minsk, Belarus;*
[4] *Institut de Ciencia de Materials de Barcelona-CSIC, Campus de la UAB, Bellaterra, Barcelona, 08193, Spain*

E-mail: turchenko@jinr.ru

Among the large number of types of hexaferrites with different crystal structures, the M-type is the simplest. Hexaferrites have a rather complex crystal structure, which is represented as a sequence of spinel and hexagonal blocks alternating along the c axis and containing a rather large number of iron cations [1].
Nowadays these materials are consifered as a perspective multiferroics or materials that demonstrate coexicnance and correlation between dielectric and magnetic ordering at room temperature [2]. The milestone in multiferroics would be the realization of simultaneous coexistence of large ferroelectricity and strong ferromagnetism, together with giant ME coupling effects in one single phase at room temperature. Observation of the non-zero dipole electrical moment with remnant magnetization and relationship between magnetic and electricl sub-systems open broad perspectives for development of the room-temperature functional devices based on hybrid materials with enchanced properties such as composited based on M-type hexaferrites.

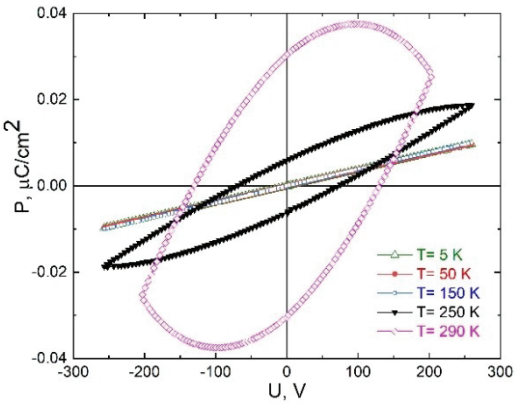

Fig.1. Electrical field dependence of the electrical polarization for $BaFe_{12}O_{19}$

In Fig.1 shows the polarization electric hysteresis loops for $BaFe_{12}O_{19}$ at different temperatures. This is an interesting fact that P(U) dependences measured at 5, 50 and 150K were characterized by the linear behavior. Our NEB calculations for the fully relaxed unit cell allows to explain such behavior due to energy barrier, which associated with two Fe2 ions shifting along the *c* axis in one direction.

[1] D.A. Vinnik, A.S. Chernukha, S.A. Gudkov et al. / Morphology and magnetic properties of pressed barium hexaferrite $BaFe_{12}O_{19}$ materials // JMMM 459, (2018) 131-135.
[2] G. Tan, X. Chen / Structure and multiferroic properties of barium hexaferrite ceramics // JMMM 327, (2013) 87-90.